given, which serves to show that whereas Dalton and Magnus definitely asserted that such a difference existed, Regnault, on the other hand, although he held it to be theoretically possible, found that it could not be detected in the case of pure substances. Regnault's observations, however, were not made at very low pressures, and his observations on water seemed to indicate that in this region a difference really existed. To test this point, the author carries out dynamical observations on water and mercury at pressures below 60 mm., and ascertains that they are in perfect accord with published statical observations. He next repeats Landolt's statical observations on the fatty acids, taking elaborate precautions to introduce dry and air-free substances into the barometer tube, and obtains results agreeing with those given in 1885 by the dynamical method. Landolt's results are thus held to be inaccurate, the presence of moisture in the liquids used being regarded as the disturbing factor. This assumption is shown by Konowalow's observations to explain why the differences varied, as already indicated, with the chemical nature of the acids.

It is therefore concluded that statical and dynamical methods give the same results even at the lowest pressures. This could hardly be otherwise, however, from the fact that in the dynamical method employed a current of air bubbles is allowed to pass continually through the liquid, ample free surface being thus allowed for evaporation.

As the dynamical method is the more easily carried out, and as the results obtained by it are affected to a much less extent by traces of moisture, &c., than those given by the statical method, it is adopted for the examination of pure and mixed substances. The apparatus here employed consists of a Beckmann's boiling-point flask which is connected up with a large air reservoir fitted with a manometer. The reservoir may be exhausted either by a water pump or by an automatic mercury pump. The liquid is made to boil in the flask, which, as usual, contains glass beads, and a current of air-bubbles is allowed to pass through the liquid. The thermometer is immersed in the liquid, preliminary observations with a pure substance having shown that the same results were thus obtained as when the thermometer was suspended in the vapour. On account of the high efficiency of the mercury pump, observations could be taken when the liquid was boiling into almost a perfect vacuum.

The substances operated upon are the first ten normal fatty acids, the first three iso-acids and monochloracetic acid, together with mixtures of the acids themselves, and of formic acid and acetic acid, with varying amounts of water. Excellent drawings of the apparatus used, including the various pumps employed, mercury joints, &c., and curves representing the results obtained, in which 1 c.m. corresponds with 1 mm. and 1° are supplied separately along with the volume. The graphical representation of the results, and indeed the whole contents of the book, indicate that the research has been carried out with the greatest care.

As the numbers obtained are to be discussed and compared with those of other observers in a second volume, which has not yet appeared, it is perhaps out of place to say much by way of criticism at this stage. It is to be hoped, however, that in vol. ii. Ramsay and Young's work will be more fully considered, for in the present volume, especially when dealing with the identity of the values given by statical and dynamical methods, it receives anything but its fair share of recognition.

J. W. RODGER.

NOTES.

AT the coming meeting of the British Association, which will be held at Oxford, under the Presidency of Lord Salisbury, Prof. A. W. Rücker will preside in Section A (Mathematics and Physics); Prof. H. B. Dixon in Section B (Chemistry); Mr. L. Fletcher in Section C (Geology); Prof. Bayley Balfour in Section D (Biology); Captain Wharton in Section E (Geography); Prof. Bastable in Section F (Economic Science and Statistics); Prof. Kennedy in Section G (Mechanical Science); Sir W. H. Flower in Section H (Anthropology); and Prof. Schäfer in the new Section I (Physiology). The evening discourses will be delivered by Prof. J. Shield Nicholson and Mr. W. H. White. Sir Douglas Galton will be proposed as President for the meeting in 1895, at Ipswich.

PROF. BURDON SANDERSON, F.R.S., and Mr. T. Pridgin Teale, F.R.S., have been selected by the University Board o the Faculty of Medicine to represent the University of Oxford at the International Medical Congress to be opened at Rome on March 29.

THE annual Congress of the British Institute of Public Health will be held in London, from July 26 to 31, 1894, under the presidency of Dr. W. R. Smith. It will be arranged in five sections: Preventive Medicine, Chemistry and Climatology, Engineering and Building Construction, Municipal and Parliamentary, and Naval and Military Hygiene.

AN imperial *iradé* has been issued, a Turkish paper says, ordering the establishment in the chief town of each province of an antirabific laboratory similar to the one which has been working for some time in the capital. These Pasteur institutes will be established first of all in the chief towns of the most distant provinces of the empire, such as Yemen, Bagdad, Damascus, Erzeroum, and Monastir.

MR. KARL PEARSON has resigned his appointment as Gresham Lecturer on Geometry.

SEVERE earthquake shocks were felt in Odessa and other parts of Southern Russia on Friday and Sunday last.

DR. ELBS, Professor of Physical Chemistry in Freiburg University, has been appointed Professor in Giessen University.

MR. PETER JAMIESON has resigned his position on the scientific staff of the Fishery Board for Scotland.

THE death is announced of Emeritus Professor Swan, who held the Chair of Natural Philosophy in St. Andrews' University for twenty years.

M. EUGÈNE CATALAN, whose death we announced last week, was inadvertently stated to be connected with the Paris instead of the Brussels Academy of Sciences. Though born in Bruges eighty years ago, he was educated in Paris, and accepted French naturalisation. He entered the Polytechnic School in 1834, and was afterwards admitted into the civil engineering service, but gave up his post in order to devote himself to the teaching of mathematics, in which vocation he was very successful. He obtained a Professor's Chair at Charlemagne, and, at a later period, one at St. Louis College, and was also a *répétiteur* in the Polytechnic School. When the revolution of 1848 broke out, he ranked with the Republican party. After the *coup d'état*, however, he refused to take the oath of office, and returned to his native country, resuming his Belgian citizenship, and accepting a professorship in the School of Mines at Liège. He was the author of a large number of books on mathematics, and published many interesting theorems, principally relating to geometry and the theory of numbers.

THE Allahabad *Pioneer* says that the prize given by Sir Charles Elliott for scientific research in India has been awarded to Babu Chandra Kanta Basu, Madripur. His essay deals with the phenomenon known as the Barisal Guns.

WE learn from the *British Medical Journal* that a prize of 10,000 roubles (£1000) is offered by Count Orloff-Davidoff for the discovery of a remedy "perfectly certain to cure or to protect horned beasts against cattle plague." The efficacy of the remedy is to be proved by the same standard as those known to science as protective against small-pox, anthrax, swine fever, &c. The award of the prize is in the hands of the Curator of the Imperial Institute of Experimental Medicine of St. Petersburg acting on the advice of a committee of experts selected for the purpose. The competition is open to the whole world with the exception of active members of the above-named institute. The description of the proposed remedy must be clear and complete; it must be sent in, under the ordinary conditions as to concealment of the identity on the part of the author, on or before January 1, 1897. The award of the prize will be made on January 1, 1899. If no remedy satisfies the committee, a further competition will take place, and the award made on January 1, 1902.

MR. F. G. JACKSON, whose scheme of Arctic exploration from Franz Josef Land as a base has been frequently referred to in NATURE, announces definitely that he will set out on his expedition this summer, the whole cost of equipment being borne by Mr. Alfred C. W. Harmsworth, of St. Peter's, Kent.

THE Canadian Geological Survey, not content with mapping the peopled and fertile regions of the Dominion, have for several years been actively engaged in exploring the vast tracts of utterly unknown lands in the far north. Mr. J. B. Tyrrell, who has had much experience in pioneer work, started from Lake Athabasca in June 1893, with his brother Mr. J. W. Tyrrell, to cross the Barren Lands in canoes on the unmapped rivers. From Black Lake a portage was made to the head of a river, the Doobaunt, sketched in, from native report presumably, on Stieler's Atlas, but shown in practically the same position as the Messrs. Tyrrell found it to occupy. Descending this river and its chain of connected lakes for over 800 miles, they reached the head of Chesterfield Inlet on Hudson Bay in the beginning of September, and after completing the survey of that region, made a perilous canoe voyage in the open sea to Fort Churchill, whence the journey was pursued on foot, Winnipeg being reached, after many hardships and much suffering, early in 1894. Mr. A. P. Low, of the same Survey, carried out an important piece of exploration last summer, passing through the centre of the Labrador peninsula from the south to Ungava Bay on Hudson Strait, in the course of which he crossed 750 miles of country hitherto quite unknown. Mr. R. G. McConnell was also engaged in explorations on the upper valley of the Peace River, in the Rocky Mountain region.

SOME time ago, in the Gurhwal district in India, an immense slip from a precipitous mountain blocked the valley of the Behai-Ganga River. The dam is some nine hundred feet high, and is already consolidated in its lower portions. The water confined within it has now reached a height of 450 feet, and is fast increasing. It is feared that the winter rains will cause a sudden overflow of the water, and bring an overwhelming disaster to the villages in the valley beneath. Nothing can be done to avert the disaster. Lieutenant Crookshank, R.E., is stationed near to watch the progress of events, and give timely warning.

OUR contemporary and namesake, *Die Natur*, has an article by Dr. Karl Müller on Prof. Philippi's paper, to which we recently called attention, on the analogies between the floras of Chili and Europe. He regards them as furnishing a striking example of the general law that similar conditions will produce, on the most widely separated portions of the surface of the earth, the same type, whether of animal or vegetable life, but in different forms.

WE learn from the *Circular* of the Johns Hopkins University (Baltimore), that Captain John Donnell Smith has signified his intention of presenting to the University his valuable botanical library and herbarium, as soon as a suitable building shall be offered for their reception, and provision made for their maintenance in connection with a department for instruction and original work in botany. They are already open to the students in botany at the University. The herbarium is one of the largest and best selected private herbaria in existence, and is especially rich in the flora of Guatemala and other parts of Central America, where Captain Donnell Smith has made large collections himself, including a great number of new species and some new genera. This indefatigable collector has again started on another visit to Central America.

DURING the afternoon of February 23, a remarkable oscillation of the barometer took place in the northern parts of these islands, accompanied by a south-westerly gale of great force and suddenness. At 8 a.m. the reading published by the Meteorological Office for Stornoway was 29·39 inches, being a fall of 0·7 inch since the previous day, and at 6 p.m. the reading was 28·58 inches. But from a tracing of a self-recording aneroid, kindly sent to us by Mr. R. H. Scott, F.R.S., it appears that the minimum occurred there about 4 p.m., and was about 0·3 inch lower than the 6 p.m. reading. The fall during the eight hours preceding the minimum had been 0·9 inch, and between 2 and 4 p.m. the barometer fell at the rate of nearly 0·2 an hour, while the rise during the next two hours (as shown above) was nearly as rapid. This remarkable oscillation was fully borne out by the changes at other stations, where they were probably smaller in extent. By 8 a.m. on the 24th the centre of the disturbance had travelled in a north-easterly direction to the coast of Norway.

AT the Society of Arts, on the 28th ult. Mr. G. J. Symons read an interesting paper on "Rainfall records in the British Isles." About forty years ago, Mr. B. Denton read before that society a paper pointing out the advantage of daily rainfall values, and giving the means for about 100 stations, and in 1860 Mr. Symons printed in the *Builder* a summary for the year 1859; subsequently he obtained some small grants from the British Association, which enabled him to continue his useful work with great success. In the year 1860 the total number of stations from which he received records was only 168, but in the year 1892 the number had increased to 2850. Ireland has not a fair share of stations, although a large number of rain-gauges have been gratuitously distributed; the returns only amount to 192. The question of the size of the gauge was discussed, from those of 1 inch to those of 6 feet in diameter, and the practical result is that the rainfall collected does not differ as much as 5 per cent. in any case, and for the smaller gauges it agrees within less than 2 per cent., so that it becomes merely a question of the most convenient size for use. As regards the influence of elevation on the amount of rain collected, the decrease is owing chiefly to the velocity of the wind being greater at a height. The first observations of this kind were made by Dr. Heberden on the top of Westminster Abbey more than a hundred years ago. Prof. Hellmann has also shown that if a gauge on a roof can be screened from the wind, the rainfall will not differ materially from the amount measured on the ground. Among the various diagrams exhibited was one representing the relative rainfall of about 160 successive years. From 1730 to 1750 the rainfall was considerably deficient, and there was no period of more than five consecutive wet years down to very recent times, but from 1875–83 there were nine consecutive wet years. Attention was drawn to the peculiar fact that

since the year 1812 every year ending with 4 had less than the average rainfall, excepting that every twelfth year reckoning from 1860 has had more than the average rain. According to this, the present year should be a dry one. Another diagram represented a notable instance of a torrential rain which occurred in the metropolis on June 23, 1878. It is an unusual thing in London for an inch of rain to fall in twenty--four hours, but in this case 3¾ inches fell in an hour and a half.

THE U.S. *Monthly Weather Review* for November contains some remarks by the editor on a series of measurements of the growth of trees, made by Mr. J. Keuchler, of Gillespie County, Texas, about two hundred miles north-west from the Gulf Coast at Indianola. Mr. Keuchler seems to have adopted the idea that a tree bears the history of its climatic surroundings written in itself, and that its annual rings of growth vary in size mainly with the supply of water to the roots, so that broad rings indicate wet years, and thin rings that can scarcely be distinguished with the naked eye denote dry years. After carefully selecting trees for his measurements, he felled three oaks, two of which were over 130 years old. He cut a perpendicular section from each trunk near the thick end, planed its surface very smooth, and then varnished it over, which made the annual ring distinctly visible. From each section a table was prepared of the relative order and position of the annual rings; upon comparing these three tables they were found to correspond exactly, thus indicating that moisture is the principal cause of the difference in the breadth of the rings. Taking the width of the respective rings as a criterion of moisture, the record of 134 years shows 6 years extremely dry; 8 very dry; 19 dry; 17 average; 18 wet; 60 very wet; 6 extremely wet. The editor of the *Review* points out that the large number of very wet years is not at all in accord with the rainfall records during the years 1840 to 1890, and, in fact, no region on the globe is known where the distribution of the rainfall is similar to that given by these records. It is evident, therefore, that the breadth of the annual rings of growth adopted by Mr. Keuchler as corresponding to dry and average and wet seasons needs considerable modification. The width of the annual rings depend, at least in part, upon the evaporation, the sunshine, the temperature, and the distribution of rain in frequent showers or in frequent heavy floods. It is the combination of several favourable meteorological circumstances that must have produced the large number of broad rings which Mr. Keuchler has attributed to 60 very wet years and 6 other extremely wet years. In fact, the editor continues, it is best not to attempt to establish any fine details as to the climate from such a record of tree growth, but to be content with the general statement that there were 14 years during which the climate was unfavourable for the increase of woody fibre, 54 years during which there was an average favourability, and 66 years that produced large growth owing to very favourable conditions. All that can safely be concluded is that during 134 years there were 66 in which the rainfall was well conserved for the use of the tree.

A PAPER, by Dr. G. Agamennone, on the velocity of propagation of the principal earthquakes felt at Zante during 1893, was communicated to the Reale Accademia dei Lincei in December last. The method adopted for the calculation of the velocity was that used by Newcomb and Dutton in the case of the Charlestown earthquake of August 31, 1886. (*Amer. Jour. Sci.* vol. xxxv. 1888, p. 1.) For the earthquake of January 31, 1893, a velocity of 4·040 kilometres per second was obtained, with a probable error of 1·120. The earthquake of February 1, 1893, appeared to have travelled with an average velocity of 3·280 ± 0·700 kilometres per second, and that of March 20 was propagated at the rate of 2·330 ± 0·330 kilometres. In these three cases, Strasburg, at a distance of 1600 kilometres, was the most remote station from Zante at which records of the wave were obtained. The disastrous shock of April 17, 1893, was recorded at Zante at 6h. 30m. 20s., Rome mean time, and it reached Potsdam, 1730 kilometres distant, at 6h. 41m. 40s. From these times, and those obtained at eight intervening stations, a velocity of 2·340 ± 0·300 kilometres was calculated. The rate of progression of the wave felt on August 4 was 2·120 ± 0·27 kilometres per second. Taking all five earthquakes, and including only the observations of the times of maximum phase, a mean velocity of 2·43 ± 0·07 kilometres was obtained. The mean velocity derived from a discussion of the commencement of the disturbances on the seismograph records was 3·085 kilometres; but whether the difference is due to the higher velocity of the first earth tremors, or merely results from the inability of some of the seismographs to record very small movements, seems to be doubtful. The point is an important one, however, and one to which attention should be directed.

SINCE the experiments of Profs. Reinold and Rücker on the thinnest liquid films, the peculiar behaviour of the black areas in soap films has become well known. Herr F. Kohlrausch, in *Wiedemann's Annalen*, describes a method of producing glass films of equally slight thickness, which share the remarkable stability of black liquid films. These are obtained by blowing out one of the duplex capillaries used by the author for mounting electrodes. These blow out into spheres with a partition across the centre, which may be reduced to extreme thinness. Those which exhibit Newton's colours of the first and higher orders break very soon, but those which are reduced far enough to appear black are sufficiently stable to keep indefinitely. Any moisture must be pumped out of the sphere, and the openings sealed up. The black areas are almost indistinguishable from holes in the plate, but show slight reflection at large angles of incidence. A peculiar phenomenon connected with these spheres is the note they give out during cooling. This note often lasts half a minute, and is analogous to that of a Trevelyan instrument with the exception that air is substituted for lead.

THE results of the investigations that reached a successful termination during the first year of the existence of the Yale Psychological Laboratory, New Haven, Conn., have just been published under the editorship of Dr. E. W. Scripture. One of the most important of the papers in the volume bears the title "Investigations on Reaction-Time and Attention," and is by Dr. C. B. Bliss. The general results of the experiments are summed up asfollows: (1) The experiments did not indicate any difference in reaction-time produced by changing the colour of the light present in the field of vision. (2) No difference was detected between the times of reactions in the dark and those made while looking at a stationary incandescent light of six-candle power. (3) When this light was in motion the reaction-time was lengthened. (4) No difference was detected between the times of reactions in silence and those made while listening to the steady sound of a tuning-fork making 250 vibrations per second. (5) When the intermittent sound of a metronome was substituted for that of the fork, the reaction-time was lengthened. (6) The reaction-time to a sound heard in both ears is shorter than when the sound is heard only in one ear, even after making allowance for the difference in intensity.

THE ninth annual report of the operations of the U.S. Bureau of Ethnology during the fiscal year 1887–88 has recently been issued. Bound up with the report are two papers, in one of which Mr. John Murdoch describes the ethnological results of the International Polar Expedition to Point Barrow, Alaska; while the other, by Captain J. G. Bourke, contains a mass of information concerning the medicine-men of the Apache Indians. Mr. Murdoch's paper is a simple and exhaustive account of the

Eskimo of Alaska, containing all that is noteworthy about that body of people. Captain Bourke thinks that the title of "shaman" might be substituted with advantage for that of "medicine-man;" for this awkward compound, invented by early explorers in North America, must always mislead by conveying some implication of therapeutics. It is pointed out that medicine-men are but the priests of a form of belief and practice called shamanism, known in many parts of the world as a phase in religious evolution. Hoddentin, the pollen of the tule, is supposed by Apaches to possess mystic properties, and bags filled with it are worn as amulets and used as charms. Captain Bourke points out the similarity between the use of the tule pollen and that of the kunque or sacred corn meal of the Zuñi, and dwells upon many analogues to their practices found in both hemispheres. The izze-kloth is the magic cord of the Apache, and Captain Bourke gives a very complete description of it. He associates these cords with the quipus of the Peruvians and the wampum of the north-eastern tribes of America, and discovers analogies among nearly all the races of the earth, paying special attention to the rosaries and belt cords of the Roman Catholic Church. Major Powell remarks that though some people will hesitate to adopt all Captain Bourke's deductions, everyone will agree with his conclusions as to the necessity of breaking up, by the exhibition of true science, the sorcery and jugglery practices which both retard the civilisation of the tribes, and shorten and destroy the lives of many individuals among them.

A *Jahrbuch* has been published containing the results of observations made at Magdeburg Meteorological Observatory during 1892, under the direction of A. W. Grützmacher.

A "BULLETIN DES PUBLICATIONS NOUVELLES," just issued by MM. Gauthier-Villars et Fils, contains descriptions of all the works published by them during the latter half of last year.

THE results of botanical studies carried on at the University of Minnesota are to be reported in a serial, which will be published under the title "Minnesota Botanical Studies," edited by Prof. Conway M'Millan.

MR. JOHN ELLIOT, Meteorological Reporter to the Government of India, has issued the Monthly Weather Report, summarising the chief features of the weather in India during the month of September 1893.

MESSRS. W. WESLEY AND SON have issued a new "Natural History and Scientific Book Circular," No. 121, containing the titles of the works on natural history, scientific expeditions and voyages, anthropology, and ethnology, that they have for sale.

THE description and discusston of the meteorological observations made in Belgium during last year, contributed by M. A. Lancaster to the 1894 *Annuaire* of the Royal Observatory, of Belgium, has been published separately by F. Hayez, Brussels.

A TREATISE entitled "Researches on Matrices and Quaternions," by Dr. T. B. van Wettum, has been published by E. J. Brill, Leyden. The memoir is divided into four parts, dealing respectively with the matrix of the second order, some properties of versor-arcs, the matrix as a unit-quotient of vectors, and the solution of a linear vector-equation.

MESSRS. G. BELL AND SONS have just published the first part of an "Analytical Geometry for Beginners," by the Rev. T. G. Vyvyan. The book deals with the straight line and circle in a simple manner, and should be of use as an introduction to more advanced works on analytical geometry. The explanations are full, and the examples are numerous and properly graded.

MR. C. M. IRVINE, writing from Fence, Lesmahagon, calls attention to the excessive rainfall measured at that place during last month. With a gauge our feet above the ground, the total fall measured was 8·96 inches, and for this year 12·69 inches. The measurements for the same months, during a period of seven years (1887–1893) gave an average of 4·468 inches, and for the month of February 2·020 inches.

AN uncommon work in Japanese binding, printed on Japanese paper, and set up in Japanese characters, has been received. The author is Mr. Tokutaro Ito, and the work contains a number of papers, chiefly on botany and zoology, brought together and published in commemoration of the ninetieth birthday of his grandfather, Keisuke Ito. Among other subjects, the essays deal with the *Burmanniaceæ* of Japan, *Oxyria digynia*, Hill, found in Japan, and the revision of Japanese Pedicularis.

MESSRS. JARROLD AND SONS have just published a new and interesting work entitled "Object Lessons in Botany from Forest, Field, and Garden," by Mr. E. Snelgrove. Botany rightly taught is the most pleasurable of sciences; and the guiding principle adopted by the author in the preparation of his book, namely, that of using common objects for illustration of unknown characters and functions, not only arouses interest, but must impart a large amount of sound instruction. The book will be useful to teachers in elementary schools, and should be a means of opening pleasant paths to their young students.

TWO new volumes have recently been added to the Aide-Mémoire Series edited by M. Léauté, and obtainable from MM. Gauthier-Villars, or G. Masson, Paris. In one of the books, entitled "Gîtes Métallifères," by Prof. L. de Launay, the author deals chiefly with statistics relating to the production and use of metals, taking the metals one by one, and giving the annual consumption of each, and the sources of the ores. Mining engineers and metallurgists will find the book useful. The second work referred to above—"Construction des Navire," by Prof. A. Croneau—contains a good course on the principles of ship construction.

THE *Annuaire de l'Observatoire Royal de Belgique* has arrrived at its sixty-first year of issue. M. Folie contributes to the present volume an essay on variations of latitude; three articles on the determination of the constants of mutation and aberration; and one in which the question as to the direct or the retrograde movement of the instantaneous pole is discussed. M. Niesten writes on variations of latitude, and the Perseid meteors of 1893. M. Vincent gives instructions for the observation of periodic natural phenomena, and M. Lancester describes the weather in Belgium during last year. The *Annuaire* contains the usual record of astronomical discoveries, meteorological observations, and statistical tables.

DR. A. DODEL'S "Biologischer Atlas der Botanik" (*Iris* series), published by C. Schmidt, Zurich, contains as excellent a set of coloured botanical diagrams as it is possible to desire for teaching purposes. The collection comprises seven large wall maps, upon which sixty-seven figures of parts of *Iris sibirica* are depicted. The figures illustrate the root, stem, leaves, flowers, and fruit of the plant in an admirable manner, the magnification being stated in each case, and in accuracy of delineation and beauty of reproduction they could hardly be excelled. The whole of the illustrations are from original drawings contained in an unpublished monograph by Dr. Dodel.

A BULKY volume just issued, vol. viii. of the "Travaux et Mémoires du Bureau International des Poids et Mesures,"

has for its contents the first part of a memoir by Dr. Max Thiesen, entitled "Kilogrammes Prototypes." The paper contains the results of comparisons of the weights of forty-two standard kilograms, designated *Prototypes nationaux*, made by Dr. Thiesen between 1886 and 1888. Of the 251 comparisons made, 230 were executed according to the scheme adopted by the International Committee of Weights and Measures in 1886; the remaining 20 had for their object the determination of the influence of transport on the prototypes. The plan of observation and all the elements used in the reduction of the observations are included in the present paper; but the details of the investigation, and the discussion of the results, are reserved for a future volume.

THE astronomical observations made by Tobias Mayer, at Göttingen, from 1756 to 1761, were published in 1826 by the Commissioners of Longitude. Five years later, Baily's memoir on Mayer's catalogue appeared, together with a comparison of the places of most of the stars with those given by Bradley. The celebrated "Sternvergeichniss" has again been discussed, this time by Dr. A. Auwers, with the assistance of other astronomers, and the results are given in a volume published by Engelmann, of Leipzig. The catalogue thus produced contains the places of 1027 stars computed for the epoch 1755.0. The volume also includes a discussion of Mayer's positions with those given by Bradley and others for the same epoch, a good series of proper motions being obtained by the comparison.

IN these democratic days, very few journals affect to ignore the requirements of that undefinable quantity—the general public. This is what *Science Progress* does, however, in its first number, a copy of which has been sent to us. All the articles in this new publication are what our friends across the Channel term *articles de poids*—solid dissertations on the present state of knowledge of various subjects. Prof. Fitzgerald contributes a suggestive article on physical science and its connections, and Mr. J. W. Rodger describes the new theory of solutions founded by van't Hoff. Insular floras are passed in review by Mr. W. B. Hemsley, and the importance of the study of fossil plants is made out by Mr. A. C. Seward. The origin and nature of certain bacterial poisons forms the subject of an article by Dr. G. A. Buckmaster; the present outlook of vertebrate morphology is discussed by Prof. G. B. Howes, and a summary of the most important papers recently published in chemical physiology, or physiological chemistry, is given by Prof. W. D. Halliburton. Such are the subjects dealt with in the new magazine. References lie on the pages as thickly as leaves in Vallambrosa, and show the immense amount of work that has been done. The new venture appears to stand in the same relation to the majority of scientific journals as the heavy monthlies do to weekly newspapers. We hope that it will meet with a large measure of success.

IN a recent number of *Électricité* (Paris), M. G. Claude gives an account of some experiments he has made on the electric arc in an alternating circuit. The phenomena produced by the disruptive discharge, in spite of the numerous experiments made with a view to elucidate them, are still far from completely elucidated. Thus, for example, it is well known what lengthy discussions have taken place over the question whether the electric arc, either with a continuous or alternating current, is the seat of a back electromotive force, or whether it behaves simply as an ordinary metallic resistance; yet it would be hardly true to say that this point has been definitely settled. In one of his experiments M. Claude joins two points, between which there is an alternating difference of potential of 2400 volts (frequency about 80 per second), by about 12 incandescent lamps (16 candle-power, 100 volt), a condenser of 0·1 microfarad capacity, and a make and break key all placed in series. When the key is closed, the circuit is traversed by the charge and discharge currents of the condenser, the magnitude of which can easily be calculated, and which suffices to make the filaments of the incandescent lamps just glow. If now the key is opened so that there exists a small spark gap in the circuit (about 1 mm.), an arc will be struck at this point. Now this arc is certainly an additional resistance in the circuit, small it may be, since it is formed between metal points, but which certainly cannot be less than that which existed when the metal points were in contact. It is now found that the lamps show an increased brilliancy, and this brilliancy increases as the arc is made longer. This increase is such that, for the longest arc obtainable (a little over 1 mm.), the difference in potential between the terminals of each lamp rises from 30 volts to 90 volts, while the difference of potential between the terminals of the key is found to be about 1200 volts. The author gives the following explanation of this experiment:—The arc is a discontinuous phenomenon, and requires a certain minimum value to start, and thus, while the E.M.F. is below this value, no current passes, and the condenser remains uncharged. When the limiting E.M.F. is reached, the arc is struck, and the condenser is charged suddenly at a high potential. This charging of the condenser is limited to a fraction of the complete period, so that the charge current lasts a shorter time, and is of greater intensity than when no arc exists in the circuit. The absorption of energy in the lamps being proportional to the square of the current is increased, for the mean square of the current in the circuit is increased when the arc is present. The material forming the points between which the arc is struck, exerts an important influence on the facility with which the arc is maintained when the difference of potential diminishes, so that, although a much longer arc can be obtained by using carbon terminals, the above effect is not nearly so well marked as with terminals of iron or copper. It is of course necessary to have a condenser placed in the circuit to obtain the increased brilliancy of the lamps, for otherwise during the time the spark is unable to pass no current passes, while when the current does pass it has the same value it would have at the same part of the cycle if the spark gap were closed. On performing the experiment, M. Claude finds that when there is no condenser in circuit the luminosity of the lamps is slightly reduced when the arc is formed.

MR. A. GIBB MAITLAND, of the Queensland Geological Survey, points out that the sentences after that beginning "For a general colony map," in NATURE, vol. xlix. p. 109 (November 30, 1893), refer to the work being carried out by the staff on the Charters Towers Gold-field, and not to the whole colony.

THE additions to the Zoological Society's Gardens during the past week include an Indian Kite (*Milvus govinda*) from India, a Common Kestrel (*Tinnunculus alandarius*), a Golden Eagle (*Aquila chrysætus*), a Barn Owl (*Strix flammea*), a Tawny Owl (*Syrnium aluco*) British, a Great Eagle Owl (*Bubo maximus*) European, a Spotted Eagle Owl (*Bubo maculosa*) from South Africa, presented by the Crystal Palace Company; two Levaillant's Francolins (*Francolinus levaillanti*), two Barn Owls (*Strix flammea*) from Port Elizabeth, South Africa, presented by Mr. B. Matcham; a Bar-tailed Godwit (*Limosa lapponica*), a Grey Plover (*Squatarola helvetica*), a Dunlin (*Tringa alpina*) British, two Ceylonese Hanging Parrakeets (*Loriculus asiaticus*) from Ceylon, purchased; and Eland (*Oreas canna*, ♀) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE AURORA OF FEBRUARY 28.—A fine auroral display was observed in various parts of England on the evening of Wednesday, February 28. Several letters describing the phenomenon have been received, and the following from Mr. C. Thwaites gives a clear account of the general appearance at Norwich:—